

rairie, Lima and Keene, and injuring many persons. At 5 p. m. of the 24th a severe tornado occurred in Jasper county, Missouri, and at 7 p. m. in Christian county, Illinois, killing and injuring persons and doing great damage to property. Violent thunder-storms also occurred at various other points in Illinois and Missouri. Details are to be found under the head of *Local Storms*. The area moving due northward during the night was central the morning of the 25th in Iowa and that afternoon in Wisconsin. Changing its course to the northeast it passed over the Upper Lake region during that night, and on the 26th moved down the valley of the St. Lawrence. The signals displayed in the Lake region on the 22nd for high area No. X, were continued for this storm until the afternoon of the 25th, and were then lowered, having been fully justified, as shown elsewhere.

No. XV.—This area advanced southeastward from Saskatchewan during the 27th, reaching Dakota the morning of the 28th. Thence, by a nearly northeast course, it passed during the 29th through the Upper Lake region, and on the 30th down the valley of the St. Lawrence. Its passage through the Lake region was marked by brisk winds, which justified, except at scattered stations, the signals displayed during 29th and part of the 30th; maximum velocities: Grand Haven, E. 28; Rochester, W. 32; Milwaukee, NW. 36; and Sandusky, NW. 42. On the Atlantic coast Cautionary Signals were displayed during the 29th at all stations except Jacksonville. These signals were lowered during the 30th on the South Atlantic coast, but were continued on the New England and Middle Atlantic coasts until the morning of May 1st. During the 29th violent southerly gales, with heavy rain-squalls, prevailed along the entire Atlantic coast, followed, in connection with advancing high area No. IX, by heavy westerly gales from Maine to Delaware; maximum velocities: Boston, SW. 37; Eastport, S. 39; Barnegat, S. 43; Kittyhawk, S. 46; Delaware Breakwater, S. 52; Wood's Holl, S. 56. This storm was generally reported to have been one of the severest experienced for years along the New England and Middle Atlantic coasts.

## INTERNATIONAL METEOROLOGY.

Two International Charts, Nos. IV and VI, accompany the present REVIEW. They are for the months of *September, 1877*, and *March, 1878*. The charts of mean pressure, &c., for *September, 1878*, have been delayed to permit the compilation of chart for *September, 1877*, which completes the series for the autumn months of that year.

No. IV indicates the probable course of six of the principal storm-areas (No. I, II, IV, VI, IX and XI) occurring over the North Atlantic ocean during the month of *March, 1880*. This month was generally characterized by a rapid succession of high and low pressure areas and consequent stormy weather over the United States, Canada and that portion of the North Atlantic ocean to the north of a line running from the Bermudas to 50° N. 25° W., while over northwestern Europe high pressures and, in general, clear, dry weather were prevalent, except during the regime of low areas Nos. I, III and XI. Area No. I was, on the 1st, 2nd and 3rd, central to the north of the British Isles and North Sea, whilst the trough of low pressure extended far to the westward over the Atlantic; severe westerly gales prevailed from the English channel to 40° W., and from this meridian to the American coast, cold northwesterly winds, accompanied by occasional violent snow and hail-squalls, in advance of an area of high pressure (No. I, *MARCH WEATHER REVIEW*) central over the United States. On the 3rd the highest pressure of the month (about 30.47 in., or 774.0mm.) was recorded at the Bermudas, and from the 4th to the 7th this high pressure moved slowly eastward to the region of the Azores. During these days, namely, from the 4th to the 7th, two areas of low pressure (the last of which is shown on chart No. IV as area No. II) left the American coast and, passing eastward over the Banks of Newfoundland, curved towards the northeast, about 50° W.; hard to violent winds, from S. to W., accompanied by severe rain-squalls, were experienced from 40° to 50° N. and from 30° to 50° W. During the 7th the pressure rose rapidly over western Europe, and on the morning of the 8th an area of quite high pressure covered the region included between 15° W. and 25° E. and 35° to 60° N. From the latter date to the 29th the pressure remained high over the greater part of this region, and apparently formed a barrier to the passage eastward of low pressure areas from the Atlantic. On the 9th only moderate winds were reported over the Atlantic, except that S. S. *Amerika*, in 48° 29' N., 31° 10' W., had an ENE. wind, force 8, with barometer down to 29.52, or 749.8. This appears to have been due to a small area which passed northward on the 10th, followed by NW. gales about 50° N. 30° W. Area No. IV. (No. V, *MARCH REVIEW*) passed off the American coast during the morning of the 9th, and on the 10th passed eastward to the north of the Bermudas, where the wind increased to WSW., force 6, with threatening weather. Brigantine *George*, (10th,) in 32° 25' N., 68° 35' W., had a WSW. moderate gale, with low barometer, showers and rough sea. High pressures (area No. IV, *MARCH REVIEW*) and cold weather prevailed in the vicinity of Newfoundland. On the 11th and 12th low area No. IV moved rapidly northeastward; and severe gales from SE. to NW. have been reported in 41° N. 60° W., 42° N. 53° W., 43° N. 47° W., 47° N. 40° W., and continued southerly gales thence eastward. S. S. *Amerika* (11th, in 45° N. 43° W.) reported barometer, at 7:35 a. m., Washington time, 29.30, or 744.2, wind SW., force 11, very heavy sea; "had a heavy gale from SE. to NNW. and back to W." Bark *Silver Cloud*, from New Brunswick to Great Britain, on the 11th had a severe SE. gale, with terrific squalls, veering, at 5 p. m., to SSE., and on the 12th severe gale from NNW.—vessel abandoned on the 12th in 45° N. 42° W. After the morning of the 12th, the progressive motion of this area appears to have lessened decidedly, and the area to have curved toward the east. S. S. *Hibernian* reports 12th, in about 50° 39' N. 33° 17' W., lowest barometer 29.25, or 743.0, strong gale from SE. by S., with heavy rain; 13th, 52° 17' N. 27° 14' W., lowest barometer 29.26

or 743.2, wind SE. by E., violent gale of hurricane force, and heavy rain of short duration. On the 14th S. S. *Ohio* reports, in  $49^{\circ} 49' N. 26^{\circ} 55' W.$ , barometer 29.35 or 745.5, wind WSW. 6, with hail. From the 15th to the 18th, low pressure, with hard gales and high seas, continued to prevail over the eastern portion of the Atlantic (between  $45^{\circ}$  and  $55^{\circ} N.$ ), and from the 16th to the 19th a low pressure area (No. X, March REVIEW) moved rapidly northeastward from the American coast, crossing the Banks of Newfoundland on the 17th, to about  $55^{\circ} N. 30^{\circ} W.$  on the 19th. On the 19th and 20th, low area No. VI (No. XI of the March REVIEW) passed rapidly eastward as a severe hurricane, from the American coast, between Nova Scotia and the Bermudas, to about  $50^{\circ} W.$  S. S. *Celtic*, 20th, in  $40^{\circ} N. 63^{\circ} W.$ , 7.35 a. m., Washington time, reports barometer 28.53 or 724.6, wind N. by W., force 12, and also adds "from 10 a. m. until 4 p. m. terrific gale from N., with hurricane force at times, compelled to steer ship before the sea to avoid damage, the wind having veered from E. to N., with a tremendously high confused sea." S. S. *Ohio* reports 19th,  $43^{\circ} N. 54^{\circ} W.$ , barometer 30.14, NW. 3, snow; 20th  $42^{\circ} N. 58^{\circ} W.$ , barometer 28.82, NW. 11, thick snow storm; and 21st,  $40^{\circ} N. 66^{\circ} W.$ , 29.84, SE. 2, snow; and adds "from midnight (19th and 20th) to 4 p. m., 20th, violent gale, commencing at ESE. and backing to N., with very heavy squalls and thick snow, barometer falling rapidly—kept ship before the sea until 7 p. m." As instances of the unsettled condition of the weather prevalent over this portion of the Atlantic during the latter half of March the following may be noted: the *Ohio* reported snow or hail on each day from the 14th, in  $50^{\circ} N. 27^{\circ} W.$ , to the 21st, in  $40^{\circ} N. 66^{\circ} W.$ , the barometer observations showing low pressures on the 14th, 16th, 18th and 20th; the *Nederland*, from the 17th, in  $48^{\circ} N. 19^{\circ} W.$ , to the 29th, in  $40^{\circ} N. 73^{\circ} W.$ , reported "much rain" for the 24 hours preceding the reports of the 17th, 19th, 21st, 22nd, 23rd and 28th, "rain" on 25th, "showers" on 20th and "snow" on the 24th, 27th and 29th, had low pressures on the 17th, 19th, 22nd, 25th and 28th. During the hurricane of the 19th, 20th and 21st many disasters to shipping occurred, among which the following may be noted: Brig *Rescue* abandoned in  $39^{\circ} N. 70^{\circ} W.$ ; Brig *Victor* abandoned in  $37^{\circ} N. 58^{\circ} W.$ ; Bark *Memphis* abandoned in  $39^{\circ} N. 59^{\circ} W.$ ; Ship *Wassenaar* abandoned in  $44^{\circ} N. 39^{\circ} W.$ ; Bark *May Queen* lost two men overboard; Bark *Queen of Hearts* in  $38^{\circ} N. 62^{\circ} W.$  lost three men overboard; while numerous vessels had decks swept of everything movable. From the 22nd to the 26th this storm moved very slowly northeastwards with diminished energy near the center, but followed by northwest gales, high seas, rain, sleet or snow from  $35^{\circ}$  to  $55^{\circ} W.$  Low area No. IX (No. XIV March REVIEW) passed off the New England coast on the 24th, and moved east and northeastward off the coasts of Nova Scotia and Newfoundland during the 25th and 26th, accompanied by very low pressures and followed by northwesterly gales and high seas. On the morning of the 28th, while low area No. XV was yet central over the United States, a second centre had formed off the Middle Atlantic coast, which rapidly developed into a severe storm (see No. XI present REVIEW). During the 28th, 29th and 30th it moved rapidly east and northeastward, and was encountered by the following vessels: Schr. *Addie Fuller* on the 26th, in  $32^{\circ} N. 80^{\circ} W.$ , 28th, in  $35^{\circ} N. 75^{\circ} W.$  and 30th in  $35^{\circ} N. 73^{\circ} W.$ , reports: "26th, at sunset, weather threatening; midnight, gale commenced with S. wind, which lasted until morning of the 28th; it veered gradually to WSW; had occasionally terrific squalls during the gale, with velocities of 40 or 50 miles; 27th, midnight, the barometer was at its lowest (29.50 as read off); 28th, fine weather and nearly calm all day, barometer continuing low; at 8 p. m. gale commenced with wind from NNW., increasing in force from 20 to 50 miles, and continued until morning of the 31st, with severe squalls of hail and rain." S. S. *Scythia* reports: "28th,  $43^{\circ} N. 55^{\circ} W.$ , barometer 29.70 or 754.4, wind S., heavy rain; 29th,  $42^{\circ} N. 59^{\circ} W.$ , 29.33 or 745.0, NW. by W., force 4, cloudy, rough sea; and adds "Sunday, March 28th, from 3 p. m. to Monday, 29th, 4 a. m., storm with wind veering from SW. to W'ly and N'ly, with very high sea, barometer 29.28." S. S. *Hibernian*, 29th, in  $53^{\circ} N. 26^{\circ} W.$ , and 30th, in  $52^{\circ} N. 31^{\circ} W.$ —"29th, heavy gale from S., with torrents of rain and heavy sea; 30th, strong gale from WSW., with heavy sea, lowest barometer 29.22 or 742.2." On the 30th the barometer fell rapidly over northwestern Europe, thereby ending the period of high pressures which had continued since the 8th over this region. During the 31st the low area No. XI passed eastward over the British Isles and ushered in a period of unsettled weather, which continued over these Isles until the 6th of April. By afternoon of the 28th low area No. XV of the March REVIEW, referred to above, had passed off the American coast; during the 29th and 30th it moved slowly eastward between the Bermudas and Nova Scotia, and on the 31st was central some distance south of Newfoundland. The lowest pressures of the month, accompanied by thunder, lightning, rain and moderate gale, were experienced at the Bermudas on the 29th and 30th.

## TEMPERATURE OF THE AIR.

The mean temperatures for April, 1880, are shown on chart No. II. The table of average temperatures on that chart shows that the temperature was above the normal from Texas and the Mississippi valley eastward to the Atlantic, except in the lower St. Lawrence valley, and the Canadian Maritime Provinces. Over the entire country westward of Texas and the Mississippi valley deficiencies were reported, except from the Middle Rocky Mountain Slope. The greatest excess of temperature prevailed in the Middle, South Atlantic, Gulf States, Tennessee and the Ohio valley, ranging from  $3.0^{\circ}$  to  $4.0^{\circ}$  above the normal. The deficiency of  $3.2^{\circ}$  reported from the Missouri valley, covers the entire valley; if divided an excess of  $2.7^{\circ}$  would have been credited to the Lower valley, and a deficiency of about  $9.0^{\circ}$  to the Upper valley. On the Pacific coast the greatest deficiency is reported from the central region,  $3.0^{\circ}$ .

*Maximum and Minimum Temperatures.*—*Maine*: \*Cornish,  $70^{\circ}$ ; Portland,  $65^{\circ}$ ; Eastport,  $17^{\circ}$ ; \*Orono,  $14^{\circ}$ . *New Hampshire*: \*Contocookville,  $76^{\circ}$ ; Mt. Washington,  $40^{\circ}$ ; \*Dunbarton,  $18^{\circ}$ ; Mt. Washington,  $-12^{\circ}$ . *Vermont*: \*Windsor,  $74^{\circ}$ ; Burlington,  $69^{\circ}$ ; Burlington,  $16^{\circ}$ ; \*Lunenburg and \*Newport,  $14^{\circ}$ . *Mass.*